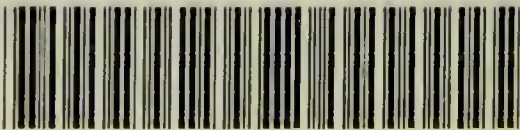





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DESCRIPTIVE BOTANY:

OR,

THE ART OF DESCRIBING PLANTS CORRECTLY IN
SCIENTIFIC LANGUAGE.

FOR SELF-INSTRUCTION, AND THE USE OF SCHOOLS.

BY PROFESSOR LINDLEY, F.R.S.

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TYRO,

Partes plantae omnes sibi reddat notissimas.

Vulgatissimas plantas a facie Herbationibus discat dignoscere.

Colligat, Exsiccet, Adglutinet ipse plantas majores, quotquot poterit.

Fructificationis partes primarias discat distinguere.

Classes & Ordines systematis sibi reddat familiares, & simpliciores evidentioresque flores ad eosdem reducat.

Demonstrationibus in Horto frequenter adsit.

Terminos artis secundum definitiones sibi habeat perspectos.

Genera sibi nota, circiter 50, secundum Genera plantarum examinet, collatis fructificationibus cum caractere.

Characteres Genericos 50, proprio Marte, eadem methodo conficiat & secundum Genera plantarum emendet.

Descriptiones specierum, 60 circiter, conficiat ex lege artis, incipiendo a simplicissimis plantis, procedendo ad difficiliore, quas corrigat Professor.

Ignotas sibi plantarum species investiget ipse, secundum Classes, Characteres, Differentiasque systematis.

Principia & Fundamentum Botanices rite intelligat.

Historiam literariam Botanices sibi familiarem reddat, & imprimis Auctores de Speciebus plantarum consulendos.

Synonyma Auctorum, retrogrediendo ad inventores, evolvere adsuescat.

Usum plantarum speciebus adscribat, Medicum & Oeconomicum.

Linn. Philosophia Botanica.

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PRELIMINARY REMARKS.

THE Examiners in Botany in the Universities of Cambridge and London, as well as at Addiscombe and elsewhere, have decided upon making Botanical descriptions a principal feature in their examination papers. To this they have doubtless been led by the difficulty, in the absence of some such exact method, of determining the comparative merits of the students who come before them. Descriptions in natural history not only demand a precision which cannot be equally well secured by any other line of examination, but being formed upon a uniform plan they can be easily and accurately contrasted the one with the other. They moreover offer examiners the means of testing the habits of observation, and the amount of knowledge gained by private study independently of any teacher. And what is most especially important, they render the practice of what is called "cramming" or "grinding" for examination impossible.

But the test in question, excellent as it is, proves extremely embarrassing to students, owing to the absence of sufficient information in recent elementary works as to the manner in which Botanical descriptions are to be prepared. In the author's "Introduction to Botany," editions 1, 2, and 3, and in the article Botany of the publications by the Society of Useful Knowledge, the subject was discussed, and it forms part of a short chapter in Professor Henfrey's *Elementary Course*, but the former of these works have long been out of print, and if procurable would hardly prove sufficiently explanatory to mere beginners. It therefore seems desirable that the art, for it is an art, of drawing up descriptions of plants in correct Botanical language, should be rendered so familiar that all who have mastered the rudiments of Botany and learned the meaning of common technical substantive names, may understand it. Most especially is it required for the sake of those who, under recent academical regulations, are admitted to examination without having been prepared in College or any great recognised school. Gentlemen who mainly rely upon self-instruction cannot dispense with a guide to such technical subjects as descriptive Botany.

In preparing the following instructions the excellent maxims of Linnæus, the father of good technical botany, and one of the most skilful describers that ever lived, have been introduced in their original Latin, by way of illustration. Those who are unacquainted with that language will, nevertheless, find the English text sufficient for their purpose.

Students are, however, strongly advised to accustom themselves to describing plants in Latin, which is much better suited for the purpose than English. They will find in the following pages good models for their imitation.

Those who are anxious to make themselves practically acquainted with Botany should exercise themselves diligently in this subject, for which the commonest weeds are as well suited as the rarest species. He who can describe readily, fully, and correctly an Aconite, an Almond-tree, a Dead nettle, Groundsel, Chickweed, a Stinging-nettle, a Snowdrop, a Crocus, an Ornithogalum, the Flowering rush, a Carex, any common Grass, Wheat, Barley, Oats, or Rye, can have no difficulty in facing the most severe examiner.

Whether a description is well drawn up may be tested by considering whether a person who had never seen the plant could make a drawing of it from the description. FOR DESCRIPTIONS ARE MERELY PICTURES IN WORDS.

An example of this will be found in the following account of a *Convolvulus* by the Rev. R. T. Lowe.

Convolvulus caput-Medusa.

C. dumosus humilis nanus pulvinato-cæspitosus ramosissimus durissimus spinosus cinereus; ramulis abbreviatis lignosis densissime glomerato-intertextis, novellis strictis rigidis acutis spinescentibus; foliis parvis lineari-oblongis v. anguste spathulatis obtusis crassiusculis sericeo-cinereis; floribus axillaribus solitariis breviter pedicellatis parvis extus sericeis, antheris (purpureo-lilacinis) in fauce apparentibus subsertis; stylis 2 distinctis filiformibus antheras paulo excedentibus.

A most remarkable and (for its genus) paradoxical species, so excessively dwarfed down and stunted that it has more the appearance, when growing, of a rounded convex stone, covered with a grey Lichen, or of some Madreporiform mass, such as the Brain-coral (*Meandrina*, Lamk.), than of a phænogamous plant; though, when torn up by the root, it presents rather the form and aspect of some enormous grey fungus (*Boletus*), being a stipitate, pulvinate, often hemispherical or turbinate, hard, woody, spinous mass of densely interwoven, rigid branches, with quite small and inconspicuous leaves and flowers in proportion to its size, like some closely-browsed or clipped-down thorny bush, and of the shape exactly of a miniature Stone-Pine (*Pinus Pinea*, L.). Root woody, very hard and stiff, nearly or quite simple and tap-shaped, covered with a rugged, longitudinally-striated, brown bark, and from the thickness of the little finger to that of the thumb at the crown, where it immediately divides into a dense mass of very short, stiff, woody, closely interlacing and entangled branches, forming a very hard, rigid, spinous, cushion-like, grey, flattened head, convex in the centre, from 3 or 4 to 18 inches in diameter, and from 1 to 6 inches thick in the middle; so hard, compact, and woody, that it will often bear the weight of a man standing or even stamping on it, without yielding or sensible disfigurement. Young shoots originating chiefly from within or beneath the roof-like cushion or *pileus* formed by the older, outwardly-knobbed, spurred and stunted, interlacing branches; straight, hard, stiff, rigid, spine-like, seldom more than 1 or 2 inches long, round, terete, sharp, and hard-pointed, finely and evenly striate longitudinally, very finely and minutely cinereo-puberulous. Leaves 2 to 5 or 6 lines long, and $\frac{1}{2}$ -1 line broad, thickish in substance, subconduplicate, clothed with adpressed silky-grey hairs, linear-oblong, subspathulate, obtuse. Flowers pretty, but small and rather inconspicuous, solitary, axillary, subsessile in the axils of the leaves on the young shoots, light rose-pink or purple, much resembling those of *C. arvensis*, L., but very much smaller, being only 4 or 5 lines in diameter. Calyx bracteolate; sepals and the adpressed bractlets oblong, short, one-third or one-fourth the length of the corolla, silky grey. Corolla 5 or 6 lines in diameter, three or four times the length of the bracts and sepals, funnel-shaped, 5-angular, and outwardly silky-pubescent in five longitudinal rays or narrow acuminate stripes.

The method here adopted of bringing the features of the plant before the mind's eye is very perfect. No one knowing how to draw can have a difficulty in representing the essential features of this *Convolvulus*, guided by the technical language alone of the describer.

It may be taken for certain that a description which will not accomplish the same end is bad.

CHAPTER I.

IMPORTANCE OF CORRECT DESCRIPTION.

“ Descriptio est totius plantæ character naturalis, qui describat omnes ejusdem partes externas.”—*Linn. Phil. Bot.*

MANY persons have experienced the inconvenience of not being able to describe correctly the curious or useful plants they have occasionally met with. More especially travellers, in attempting to communicate to others what they have seen, are accustomed, if unacquainted with natural history, either to mention the vulgar names they have heard applied to plants, or to describe them in what is called a popular manner. The vulgar names of plants rarely convey useful information, because they are very frequently used without any precision; for example, in this country, the word Laurel is applied to four different plants: the Common Laurel and the Portugal Laurel are both Cherries; the Spurge Laurel is a Daphne; the Alexandrian Laurel is a Ruscus; while the only true Laurel, commonly met with in England, is called the Sweet Bay tree. “Popular” descriptions, like the drawings of plants made by persons who are not botanists, are more calculated to mislead than inform. They either convey a false idea of what they profess to explain, or no idea at all.

Let us suppose a plant to be described in the following words:—“The leaves are about 4 inches long, narrow, dark green, smooth on the surface, plain at the edge. The flowers grow in tufts, about 10 together, and are straw-coloured; they are small, downy, and contain 6 stamens each. The germen stands up in 3 brownish segments resembling a cap. The trees are 50 to 60 feet high, evergreen, with large horizontal branches almost as low as the earth.” If the reader attempts to ascertain what kind of tree this may be, he cannot possibly succeed, for the description will apply to many kinds of plants of the most dissimilar nature. The description is useless, because the author has only mentioned peculiarities common to many trees, and has omitted all that are peculiar to a few. Had he said that the tree was “evergreen, with ribbed leaves, apetalous flowers, and 6 stamens having recurved anther-valves,” thus using the technical and precise language of science, instead of the vague and uninformative phraseology of mere conversation, he would have conveyed a distinct idea to the mind of the reader, at the expense of only about a dozen words instead of sixty-eight; or he could have combined the two, which, for the purposes of narrative, might have been better.

Linnæus gives some examples of this kind, which, as well as the precepts that introduce them, the student will do well to consider.

Descriptio justo longior aut brevior utraque mala est.

Longa nimis evadit descriptio cum color viridis in Herba, mensura partium et similia, facillimè variantia, diffusa oratione propenuntur.

Breviores justo evadunt descriptiones cum excluduntur notæ singulares, et partes essentielles Herba, licet minimæ, uti Stipulae, Bractea, Glandulae, Pili, et similia.

By way of further illustration, he quotes three descriptions of *Linum usitatissimum*, the common Flax plant, viz.:

A. Tho very short and imperfect one of Dodonæus.

Radices cæciles. Culmi seu virgæ tenues, rotundæ. Folia oblonga, angusta, acuminata. Flores in summis virgæ, speciosi, cærulei. Vascula parva, rotunda, orbiculata. Semen aliquatenus oblongum, læve, glabrum, splendens, ex fulvo punicans.

B. A very long, superfluous, and empty one.

Radices angusta, subdivisa, intra terram recondita.

Caulis erecti, rotundi, virides bipedales vel tripedales, ramosi: Ramis caule dimidio brevioribus.

Folia angusta, viridia, acuta, plurima, uncialia ad angulum acutum a caule discedentia, basi affixa, non tomentosa, aut villosa; superiora folia tantum semuncialia sunt et quatuor lineas

lata; inferiora tres lineas lata, at suprema vix duas lineas attingunt in latitudine. Pedunculi simplices, unciales vel sesquunciales, crassitie vix dimidie lineae. Flores in summitatibus ramorum, ampli, patentes, &c.

C. With these he contrasts a natural and regular description, as he draws it up himself.

Radix simplex, perpendicularis, flexuosa, pallida: radiculis lateralibus capillaribus.

Caulis simplex, perpendicularis, teres, filiformis.

Folia alterna, sessilia, lanceolata, obsolete trinervia, acuminata, erectiuscula, utrinque glabra: subaxillaria paulo majora.

Rami ex axillis foliorum summorum, erecti, foliis minoribus instructi; rudimenta ramorum marcescentia ex axillis foliorum inferiorum.

Pedunculi foliis oppositi, eisque longiores, filiformes, nudi, terminati Fructificatione solitaria, in generibus descripta.

Cotyledones quasi quatuor, cruciatim oppositi, quorum duo inferiores subovati, superioribus duplo latiores.—Linn. Phil. Bot., § 330.

The student should compare these descriptions carefully with the *Linum* itself.

If such descriptions as have just been criticised are scientifically useless, much worse are those which proceed from professed botanists, in whose supposed knowledge and technical skill confidence is naturally reposed. In the works of some of the successors of Linnæus himself, the descriptions are so meagre and inaccurate, that they were mere botanical enigmas till the meaning of their authors was determined by other evidence than what the descriptions afford. Thus, Thunberg gives the following description of the fructification of a genus he calls *Nigrina*:—

“*Calyx* none, except a one-leaved bract. *Corolla* of four petals. *Filaments* four, very short. *Anthers* globose, white. *Germen* (ovary) superior; *style* single; *stigma* *Fruit* unknown, perhaps a capsule.”

Here, in the first place, several most essential points are neglected, such as the insertion of the stamens, the dehiscence of the anthers, the relation of the stamens to the petals, the internal structure of the ovary, the number and position of the ovules,—all ascertainable without difficulty, and the more indispensable because of the absence of fruit. Then, irrelevant matter is introduced, such as the length of the filaments and colour of the anthers. And, finally, which is worse than all, the description is false; for the flowers have neither calyx nor corolla; the filaments are three, not four; and the anthers are not globose, but irregular, ovate, compressed, fleshy bodies.

But it is not in negligent observation alone, or in the misplacing the members of a sentence, that an essential character may be defective: it may be expressed with a certain kind of exactness, and a due attention to arrangement, yet words may be wrongly employed, or important characters may be omitted, or the author may not understand the structure of what he is describing. As an instance of this, the following description of the genus *CAREX*, by a botanist of eminence in his day, may be usefully studied:—

“*Barren flowers* numerous, aggregate, in one or more oblong dense catkins; their *scales* imbricated every way. *Calyx* a single, lanceolate, undivided, permanent *scale* to each floret. *Corolla* none. *Filaments* 3, rarely fewer, capillary, erect or drooping, longer than the scales. *Anthers* vertical, long, linear, of 2 cells.

“*Fertile flowers* numerous, in the same, or, more usually, in a different catkin, very rarely on a separate plant. *Calyx* as in the barren flower. *Corolla* a single, hollow, compressed, ribbed, often angular, permanent glume to each floret; contracted, mostly cloven, and often elongated at the extremity. *Germen* superior, roundish, with three, rarely but two, angles, very smooth. *Style* one, terminal, cylindrical, short. *Stigmas* three, more rarely two only, awl-shaped, long, tapering, downy, deciduous. *Seed* the shape of the germen, with unequal angles, loosely coated with the enlarged (either hardened or membranous) permanent corolla, both together constituting the fruit.”

This character is carefully written, but full of inaccurate and confused applications of terms. The word “catkin” should be “spike;” for a catkin is deciduous, a spike persistent, and the inflorescence in *Carex* is of the latter kind. In the next place, what is called the “calyx” is a bract. What is called the “corolla” of the fertile flowers consists of two confluent bracts, and is, therefore, not a single “glume,” but a double one. Finally, what is called the “seed,” is the pericarp; in the young state it is called the germen, which is equivalent to ovary, but by the time the ovary is ripe, it is metamorphosed into a seed!

Inaccuracies of this kind not only disfigure botanical writings, but very often lead the inexperienced botanist into errors and misconceptions, and are to be most carefully avoided.

CHAPTER II.

HOW TO EXAMINE AND OBSERVE.

In preparing to describe a plant the first thing is to provide the means of observation. These consist of a sharp pen-knife and a pocket lens, or, if means permit it, of a simple dissecting microscope. The pocket lens should not have a longer focal distance than an inch and half; the microscope should be supplied with a 2 inch, $\frac{1}{2}$ inch, and $\frac{1}{4}$ inch lens. If a microscope is unattainable, then what is called a "Coddington" may be employed for minute objects. But as neither a pocket lens nor a Coddington have a Stand, and as it is continually necessary for the observer to have the free command of both hands, some cheap contrivance should be provided for carrying such instruments. Travelling botanists have used a short stick, pushed into a lump of clay, the hole in the case of the lens, or the loop of the Coddington slipping over it, as in the annexed cut, or a block of wood is used. The object to be attained being merely to fix the lens steadily while the fingers are employed in dissecting below it, the mode of securing that end is unimportant.

Apparatus having been provided, the student should select for examination as perfect a specimen as he can obtain; and should carefully study every part in the order hereafter explained. In doing this he *must on no account guess*, but be *certain* that he sees correctly what is before him. This is not difficult in the case of roots, stems, leaves, and their parts; but the flower, from its general smallness, and somewhat complicated structure, demands a little skill in dissection, which is only to be gained by experience.

After its external structure has been determined, it is necessary to open the flower. Mere looking down into its tube or interior leads to nothing but error. The student should hold it in his left hand and split it *longitudinally* by a rapid cut *from below upwards*. This lays bare the whole of the interior, shows the number and position of the parts, and their insertion, which is very important. If he attempts to divide a flower by cutting it *from above downwards* he only crushes and disfigures his specimen. In the case of the ovary it is usually necessary to ascertain its placentation, which, if it is not seen in the first longitudinal section, can be best determined by making a *transverse* section.

When, as in Umbelliferous plants, the position and number of interior longitudinal passages or of superficial lines and plates demand attention, a thin horizontal slice, placed in water, and viewed by transmitted light, will give the information required.

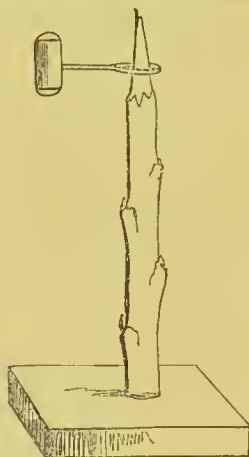
In examining seeds of any kind, where dissection is required, cut into them perpendicularly, beginning at the hilum and passing the knife through the axis; in this way the embryo and its relation to other parts usually becomes distinctly visible. Failing this the observer must have recourse to crushing, or careful skinning and unrolling.

Seeds of small size are frequently so hard and slippery that they cannot be kept steady even in water. In such case, a little stiff gum, or varnish of shell-lac, may be smeared on a slip of glass in the field of the microscope, and the seeds placed upon it. As soon as the varnish is hard and dry, they can be sliced readily with a sharp knife.

When minute parts are so opaque as not to be readily examined, the use of oil of turpentine instead of water, as the medium in which they are placed for observation, is useful.

When parts are shrivelled or dried up, as is always the case in herbaria, they must be relaxed by immersion in boiling water.

In all cases where dried flowers are to be dissected, the air should be driven out by boiling for a short time before any attempt is made to separate their parts.



CHAPTER III.

GENERAL RULES TO BE OBSERVED.

“Descriptio compendiosissimè, tamen perfectè, terminis tantum artis, si sufficientes sint, partes depingat secundum Numerum, Figuram, Proportionem, Situm.”—
Linn. *Phil. Bot.*

IN drawing up a description care must be taken that every term is used in its exact sense; that all is perspicuous and free from ambiguity, and that nothing superfluous is introduced. In the following description of *Viola tricolor*, the wild Pansy, a very large quantity of superfluous words occurs, although the terms are employed correctly.

The root of this plant consists of a great number of unequal irregular fibres. The stems first fall prostrate, and then rise up, and are perfectly smooth all over the surface; their form is square, their interior is hollow, and at every place where the leaves are set on, they are a little tumid. The leaves grow upon opposite sides of the stem at tolerably equal distances one above the other; they have a form between ovate and oblong, have a distinct leaf-stalk, and are coarsely cut at their edges in a serrated manner; they are quite destitute of hairiness, and are longer than the stipules which grow at their base. The stipules in colour and texture resemble the leaves; they are cut almost to the middle into a number of narrow lobes, of which the terminal one is much the largest; at the base they are prolonged more on one side than another, in a hastate manner. The beautiful little flowers grow singly from the stem, at the places where it joins the leaves, and they have a nodding position on their peduncle; the latter has a smooth surface, is distinctly angular, curves inwards at the upper end, and has a twist somewhere near its middle. At the upper end of the peduncle grow two small bractlets, resembling fine scales, prolonged at the base into something of a hastate figure. The calyx of this plant consists of five distinct sepals, having the same colour and texture as the leaves; they are of a narrow ovate form, sharp-pointed, quite free from hairs, not in any way lobed or divided, and extended below the point of origin into a flat rounded appendage, which is divided by small toothings at the edge: of the sepals, those which stand next the front of the flower are much the largest. The corolla consists of five petals, which are of unequal size, oblong, with a little stalk at the base, and rounded at the upper end; the two uppermost are larger than the rest, of one uniform purple colour, while the three lower are yellow, with purple lines at the base, and furnished with a little tuft of hair at the bottom of the streaks; the intermediate one of these petals is furnished with a short straight spur at the base. The stamens are five in number, inserted into the line between the base of the ovary and the sepals, not so long as the claws of the petals, and of unequal size; the anthers have no filaments, are of a membranous texture, are fringed with white hairs at the edge, and are extended into a broad brown membranous appendage at the point; those two stamens which stand in front of the flower are longer than the others, and project from their base on one side a green slender thread-shaped process, which is introduced into the spur of the front petal of the corolla. The ovary has no adhesion to the sepals, is of a spheroidal form, and contains one single cell; on its inside, the ovules, which are very numerous, grow to three broad lines running from the apex to the base of the cavity at equal distances; the ovary is terminated by a style, smooth, thickest at the upper end, bent like the letter S, and bearing at the point a round hollow stigma, through one side of which there is an opening into the interior. The ovary, when ripe, changes to a seed vessel of a dry, cartilaginous consistence, containing one cell, and dividing into three equal spreading ovate-lanceolate valves, between the broad lines on which the seeds are inserted, so that when the valves are spread open, the seeds are seen sticking to the middle. The seeds are small, shining, oblong bodies, rather narrow at the lower end, and of a pale brown colour; the point of attachment to the placenta is thickened in a fungus-like manner; from this part there rises a fine elevated line, which terminates in a depressed discoloured round spot, stationed at the top of the seed. In the interior is found an embryo of a deep green colour, quite straight, and having a taper radicle, with thin flattened cotyledons a little rounded at the back. Surrounding the embryo is found a quantity of fleshy brittle albumen, in the very axis of which the embryo is placed.

To this there is little other objection than its needless length; it is what Linnæus

called "longissima et superflua." But it is obvious that were all plants to be thus described, the 100,000 species supposed to be now known would fill 100,000 pages of ordinary matter and would form a library of themselves; added to which would be the great difficulty of wading through such a marsh of needless words. By adopting the scientific method, more than half the words are saved, and the description itself comes out more clear and comparable. The following shows this:—

ROOT fibrous.

STEMS decumbent, smooth, square, fistular, slightly tumid at the nodes.

LEAVES alternate, ovate-oblong, petiolate, coarsely serrated, smooth, longer than the stipules; stipules leafy, pinnatifid, half-hastate: terminal lobe much the largest.

FLOWERS solitary, axillary, nodding; peduncles smooth, angular, twisted, incurved at apex.

BRACTLETS two, minute, membranous, sub-hastate near the apex of the peduncle.

SEPALs five, herbaceous, linear-ovate, acute, smooth, entire at the base, prolonged into a concave, rounded, toothletted appendage: the anterior much the largest.

PETALS five, unequal, oblong, unguiculate, rounded at the apex; the two upper largest, whole coloured, purple; the three lowest yellow with purple streaks, and bearded at base; that in the middle having a short straight spur at the base.

STAMENS five, hypogynous, shorter than the unguis, alternate with the petals, unequal; ANTHERS sessile, membranous, ciliated, with a broad brown membrane at apex; the two anterior the largest, spurred; their spurs green, subulate, lying in the spur of the corolla.

OVARY superior, round, one-celled, with three parietal polyspermous placentæ; style smooth, sigmoid, clavate, as long as the ovary; stigma capitate, hollow, with an oblique aperture on one side.

CAPSULE one-celled, three-valved, with a loculicidal dehiscence; valves ovate-lanceolate, spreading, bearing the seeds in the middle.

SEEDS shining, roundish, smooth, pale brown; hilum fungous; raphe elevated; chalaza depressed on the apex.

EMBRYO straight, green, in the axis of fleshy albumen radicle terete; cotyledons plano-convex.

Even this may be shortened by omitting all that is common to *Viola tricolor* and other species of the genus *Viola*; as thus:—

ROOT fibrous.

STEMS decumbent, smooth, square, fistular, slightly tumid at the nodes.

LEAVES ovate-oblong, petiolate, coarsely serrated, smooth, longer than the stipules; stipules leafy, pinnatifid, half-hastate: terminal lobe much the largest.

FLOWERS nodding; peduncles smooth, angular, twisted, incurved at apex.

BRACTLETS 2, minute, membranous, sub-hastate, near the apex of the peduncle.

SEPALs linear-ovate, acute, smooth, entire: appendage concave, rounded, toothletted.

PETALS oblong, rounded at the apex, the two upper whole coloured purple, the three lowest yellow, with purple streaks, and bearded at the base.

ANTHERS ciliated; the spurs green and subulate.

OVARY round; style smooth.

SEEDS shining, smooth, pale brown.

In framing descriptions of whatever kind, the order of development must be observed. (*Descriptio ordinem nascendi sequatur. Linn. Phil. Bot. § 328.*)

It is not allowable to take the flower first, then leaves, then root, then fruit, then inflorescence, and so on; but the description, if complete, must begin with the root and end with the seed. Linnæus gives the following example of the manner in which this should be done, in the Lime tree (*Tilia Europæa*).

Radix: Caudex descendens, divaricatus, ramosissimus, teres, flexuosus, epidermide decidua: Radiculis capillaribus, flexuosis subramosis.

Caudex ascendens arboreus, teres, ramosissimus, cortice crasso, poroso, tectus Epidermide in antiquo striato-rimosa in tenello laevi, glabra, ramis præcedentis anni instructis gomnis alternis.

Gemmae ovate, prominentes, constructæ Squamis duabus, alternis, oblongo-ovatis, obtusis, convolutis, subcarnosis, stipulaceis.

Stipule gemmae, oppositæ, ovate, glabræ, integerrimæ, concavæ, involventes folia et caulem.

Caulis simplicissimus, teres, subflexuosus a folio ad folium, decumbenti-patens, laevis, adspersus punctis aliquot vagis obsolete.

Folia tenella conduplicata, secunda, rugosa, villosa undique; adulta cordata, nervosa, venosa, inæqualiter serrata, acuta, supra glabra, supra conspicuis adspersa, subtus in axillis vasorum majorum barbata. Petioli teretiusculi, laeves, folio breviores, fere distiche prodeuntes, interjectis spatiis folio brevioribus.

Pedunculi solitarii, petiolo laterales, longiores, filiformes, apice trifidi: lateralibus trifidis, extremitatibus unifloris; Flosculi ideoque septem, altitudine æquales.
Bractea lanceolata, obtusiuscula, albo-colorata, integerrima, longitudine pedunculi, a basi ad medium longitudinis pedunculo unita.
Floris Perianthium quinquepartitum, concavum, colorato-flavescentis, magnitudine ferme corollæ, deciduum. Corollæ Petala quinque, oblonga, obtusa, apice crenata, flavo-albicantia. Stamina Filamenta plurima: triginta vel quadraginta, setacea, receptaculo inserta, longitudine corollæ. Antheræ subrotundæ. Pistilli Germen subglobosum, hirsutum. Stylus cylindricus, altitudine staminum. Stigma obtusum, pentagonum. Pericarpium coriaceum, globosum, quinqueloculare, quinquevalve, basi dehiscens. Semina solitaria, subrotunda. Cotyledones quinquefidi, extremis et media longioribus.

In this description, terms now disused are employed, and things now attended to are neglected; but, upon the whole, it is a good specimen of his manner of description.

Another rule which Linnæus insisted upon, was, that each separate organ should have a paragraph to itself. (*Descriptio distinctas partes plantarum in distinctis paragraphis tradat.*) He required that the parts of a plant should be as clearly distinguished in a description as they are distinct in the plant itself. (*Partes plantarum in descriptione æque distinctæ evadant ac in ipsa planta.*) He also insisted upon such type being employed as would enable the reader not only to find the parts he might be in search of, but also to discover anything that was left out. (*Majusculis literis pingantur omnes partes plantæ, at partium partes minusculis et a vulgaribus diversis. Usus inde resultat quod non modo partes a Lectore facilius reperiantur, sed et quod omissa facilius in descriptione perspiciantur.*) For, he added, nothing is more tiresome than a long description in which the several parts of plants are neither distinguished by paragraphs nor differences of type. The description which Linnæus gave of the Castor-oil plant, *Ricinus communis*, illustrates his meaning:—

Radix ramosa, fibrosa.

Caulis erectus, teres, viridis, articulatus, inanis, lævis: striis sparsis longitudinalibus, superne flexuosus, altus orgyam unam alteramve.

Rami solitarii, ex axillis superioribus foliorum, cauli similes, altiores; ex inferioribus axillis breviores, vel marcescentes, vel seriores Rami.

Folia alterna, peltata, novemlobata: Lobis exterioribus majoribus, magis angulatis: Nervis totidem ab umbilico ad loborum apices excurrentibus: obtusiuscule inæqualiter serrata, reticulato-venosa, utrinque lævia, supra glabra, disco extrorsum versa.

Hæc ante explicationem plicata, serraturis glandulosis.

Petioli teretes, læves, patentes, sessiles, filiformes, longitudine foliorum.

Glandula supra basin petioli: latere superiori, obtusa, solitaria.

Glandulæ binæ peltatæ, in apice petioli: latere superiori.

Glandulæ duæ oppositæ, ad basin petioli, in caule.

Stipula petiolo opposita, membranacea, glabra, solitaria, caulem ambiens ad petiolum usque, concava, acuta, decidua.

Pedunculus ramosus terminans, e regione petioli inter ramum et stipulam, erectus, nudus, adspersus, Umbellulis alternis, sessilibus.

Involverum umbellulæ triphyllum, membranaceum, minimum, inæquale, marcescens.

Umbellulæ inferiores multifloræ, masculæ; superiores pauciores, unifloræ, femineæ.

Pedicelli alternatim exscentes deflorentesque.

Flores Masculi pedicellis longioribus insidentis.

Masculi. Calycis Perianthium monophyllum, quinquepartitum: laciniis ovatis, concavis.

Corolla nulla. Stamina Filamenta varia, filiformia, ramosa et subramosa, calyce longiora. Antheræ subrotundæ, didymæ.

Feminei. Calycis Perianthium monophyllum, tripartitum, deciduum: laciniis ovatis, concavis. Corolla nulla. Pistilli Germen ovatum, tectum spinis subulatis inermibus.

Styli tres, bipartiti, erecto-patentes, subulati, hispidi, purpurascetes. Stigmata simplicia.

Capsula subrotunda trisulca, obsolete triangularis, undique aculeata, trilocularis, trifariam dehiscens, elastica. Semina solitaria, subrotunda, maculis inæqualibus.

Although these rules are not strictly observed at the present day, and must be sometimes neglected, yet the student will find it advantageous to make it a practice to observe them. Italics, however, are needless, and are now scarcely ever thus employed.

In punctuating descriptions, always observe to separate, 1, adjectives relating to the same noun by commas; 2, parts of the same organ by semicolons; 3, distinct organs by a period; thus:

Leaves lanceolate, acuminate, villous; petiole short, winged, glandular; stipules rudimentary. Racemes terminal, nodding, many-flowered, secund.

CHAPTER IV.

OF THE USE OF SUBSTANTIVE TERMS, OR NOUNS EMPLOYED IN
TECHNICAL LANGUAGE.

THE first attention of the student will be necessarily directed to the proper application of the Nouns employed in botanical descriptions. Until this is thoroughly understood no precision can be secured. It is owing to their unskilful, or inexact, or negligent application, that the writings of some botanists are so open to criticism.

Thus we find a late popular botanical author committing the errors which were pointed out in page 6, in his description of *Carex*. The following are other examples. The common Tansy (*Tanacetum vulgare*) is stated to have the "*Germe*n (an old word for ovary) obovate, compressed; the *seedvessel* (= pericarp) none but the permanent calyx; the *seed* oblong, angular," so that the ovary becomes a seed, and a calyx becomes a pericarp! Again, in Coltsfoot (*Tussilago Farfara*), "*Common calyx* simple, cylindrical;" by which he meant involucrem. "*Seedvessel* none, except the altered calyx," thus converting bracts into a pericarp. "*Seed* obovate-oblong, compressed," meaning the real pericarp!

The same author's description of *Poa* is an instructive instance of what should be avoided. Firstly, the *Calyx* contains a *spikelct*! by which he meant that the spikelet has at the base a pair of *glumes*. Then he makes the *Corolla* consist of two valves, although the part thus misnamed (the *paleæ*) is external to all the parts of fructification in each floret, and cannot by any possible latitude of language be termed corolla; if objection were taken to the word *paleæ*, then the part should have been called a *calyx*. Finally, the *germen* (ovary) becomes a *seed* when ripe!!

A proper selection of substantive terms is therefore indispensable. In describing a *Crocus* it is not allowable to call its *corn* (a kind of stem), or the prostrate *stem* (*rhizome*) of *Acorus*, a root. The technical name of the part spoken of must be scrupulously employed.

The meaning and application of such terms are described correctly in all modern elementary works of repute, and require no illustration in this place. Where the student is referred in a succeeding chapter to figures by the letters SB, it is to *School Botany*, in which work the necessary explanation will be found.

CHAPTER V.

OF THE USE OF ADJECTIVE TERMS, OR TERMS EXPRESSING THE
QUALITY OF NOUNS.

THE great difficulty to encounter in describing plants is to know how to use the terms by which the peculiar quality of their parts is indicated. For this purpose a very great number of words is employed, some in their ordinary sense, some in quite a peculiar manner. To the first belong such terms as *Blue*, *green*, &c., expressing colour; *round*, *long*, *broad*, &c., expressing form; *blunt*, *sharp*, *thick*, *thin*, and so on. To the second may be referred words like *secund*, *coloured*, *herbaceous*, *sinuous*, *parted*, *divided*, *toothed*, which are not used in their ordinary sense.

An enormous number of words of this kind has been invented by botanical writers, as may be seen in Bischoff's valuable Handbuch,* a 4to work of 1609 pages, illustrated by 3911 figures on 79 plates. But of those many relate to Cryptogamic Botany, others to Vegetable Anatomy, some are obsolete, and a very large quantity arise out of attempts at introducing into language refinements that are inapplicable to descriptive Botany, because of the variable or uncertain attributes of the parts to which such words are intended to apply. A considerable number moreover illustrates the meaning of double adjectives, which scarcely require illustration.

* *Handbuch der Botanischen Terminologie und Systemkunde*, von Dr. G. W. Bischoff, Nürnberg, 4to.

Double adjectives are those which, formed from two words having different meanings, indicate some quality between the two meanings. Thus, *ovate-lanceolate* means a form intermediate between *ovate* and *lanceolate*; *racemoso-paniculate* indicates an inflorescence consisting of *racemes* arranged in a *paniculate* manner; *sinuate-laciniate* expresses an outline which is *sinuate*, while the lobes are *laciniate*; and so on. A little practice suffices to understand the construction and application of all such words, with which it is needless to burthen elementary works.

Linnaeus, whose descriptions are admirable for their time, used very few terms. In his *Philosophia Botanica*, 107 only are admitted among leaves, the most variable of all the organs of a plant; and even of these some are used in their usual sense, as *sulcate*, *obtus*, *acute*, &c.

In this little work such terms only are selected as the student really ought to understand, and those alone are illustrated which mere words cannot explain with precision.

CHAPTER VI.

TERMS.

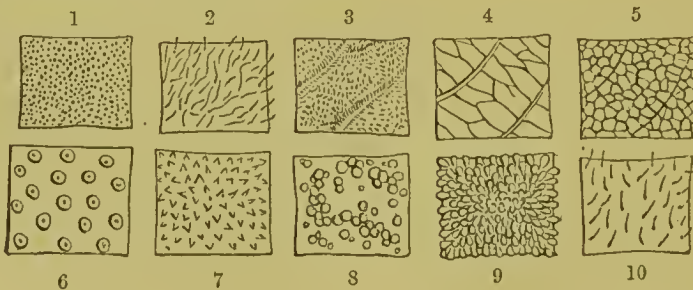
THE following terms are such as most commonly occur. The woodcuts sufficiently indicate the meaning of the words with whose numbers they correspond. Other terms are illustrated in *School Botany*, referred to as SB. When neither figures nor references are given, the words do not seem to require them.

Some terms have a universal, or GENERAL APPLICATION, being employed in the same sense wherever they are used; such are those describing *surface*, *colour*, *relative position*, *margin*, *point*.

Other terms have a particular, or SPECIAL APPLICATION, being employed when speaking of some particular part. It is, however, to be observed, that many of these special terms may be used when speaking of similar though different parts. Thus some words applicable to the forms of leaves equally belong to petals, or to any other flat bodies.

GENERAL TERMS.

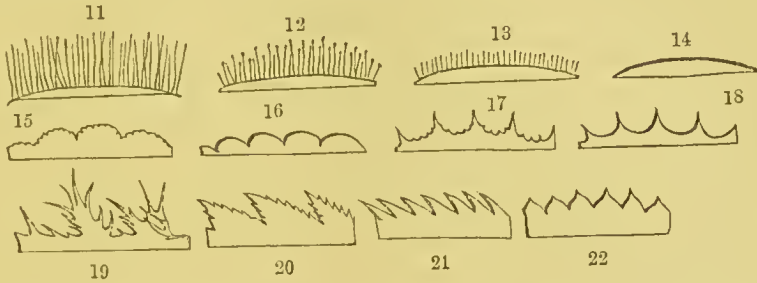
The SURFACE (*Superficies*) is naked (*laevis*); smooth (*glabra*, *polita*, *lucida*); silky, 2 (*sericea*); downy, 3 (*pubescens*); hairy (*pilosa*); shaggy (*hirta*, *hirsuta*, *villosa*); furred (*tomentosa*); velvety (*velutina*); woolly (*lanata*); cobwebbed (*arachnoidea*); scurfy (*lepidota*); glandular, 6 (*glandulosa*); dotted, 1 (*punctata*); chaffy (*ramentacea*); rough, 7 (*scabra*, *aspera*); wrinkled, 5 (*rugosa*); netted, 4 (*reticulata*); hispid, 10; warted, 8 (*verrucosa*); papillose, 9.



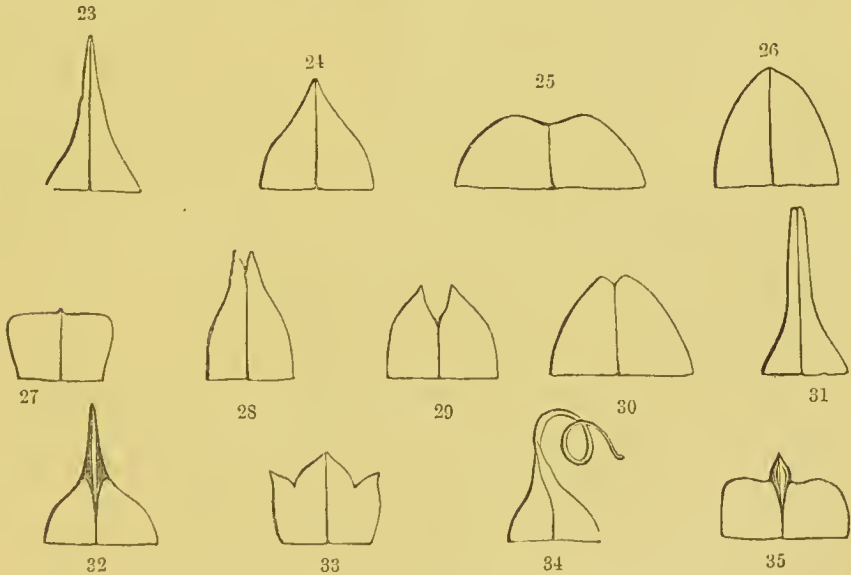
Words expressive of COLOUR are used in their ordinary sense, with the exception of "herbaceous," which always signifies green, and "coloured" (*coloratus*), which includes every colour except green. The Latin word *concolor* is employed when different parts are of the same colour; *discolor* in like manner is used when two contiguous parts are of different colours.

In RELATIVE POSITION, parts are imbricated, or overlap by their edge or points; valvate, when two straight edges fit together without overlapping; plicate, when folded like a lady's fan; convolute, when twisted in one direction; induplicate, when the edges are bent inwards; alternate, opposite; whorled (*verticillatus*), when more than two parts stand on the same level round a common axis; stellate is verticillate, with the parts narrow and sharp pointed; decussate (SB, clxxiv.), when opposite parts cross each other; distichous (SB, ccxliii.), when parts form two opposite perpendicular rows.

The MARGIN (*Margo*), is ciliatod, 13 (*ciliatus*); glandular, 12; fringed, 11 (*fimbriatus*); cartilaginous (*cartilagineus*); entire, 14 (*integer*); serrate, 21; doubly serrate, 20 (*duplicato-serratus*); toothed, 18 (*dentatus*); doubly toothed, 17; creuelled, or crenate, 16 (*erenatus*); doubly creuelled, 15; acutely crenelled, 22; wavy (*undulatus*); curled, 95 (*crispus*); spiuy, 19.



The POINT (*Apex*) is acute, 24; acuminate, 23; obtusely acuminate, 31; obtuse, 26; retuse 25; emarginate, 30; mucronate, 35; apiculate, 27; cuspidate, 32; cirrhose, 34; truncate, or præmorse, 27; bifid, 28; bipartite, 29; tridentate, 33.



SPECIAL TERMS.

The ROOT (*Rudix*, SB, i.; *Tuberculum*, SB, ii.) is filiform, 41; conical, or taprooted, 39; fusiform, 40; testiculate, 46; palmate, 44; contortuplicate, 38; fasciculate, 43; clavate, 45; fibrous, 43; fleshy; ringed, 37 (*annulata*); branched, 43 (*ramosa*); knotted, 36 (*nodosa*); capillary, or simple, 42 (*capillaris*, *simplex*); annual, biennial, perennial, *i.e.*, lasting ouc year, two years, or many years.

The STEM (*Caulis*; also *Culmus*, *Sureculus*, SB, vii.; *Rhizoma*, SB, viii., *Stolo*, *Cormus*, SB, v., *Tuber*, SB, iii.; *Truncus*, *Ramus*, *Ramulus*, *Spina*, in trees and shrubs) is turnip-shaped, 51 (*napiiformis*); placentiform, 47; branched (*ramosus*); articulated, 50; dichotomous, 56; corymbose, 54; pyramidal, 55. Solid, fistular, or chambered, 49 (*septatus*); straight (*rectus*); upright (*erectus*); very erect (*strictus*); prostrate, 52; bending down (*decumbens*); twining, 53 (*volubilis*); twisted, 61 (*tortus*, *spiraliter tortus*); tapering, or terete, 64 (*teres*); angular, 58, 59; half terete, 63 (*semiteres*); compressed, 62; two-edged, 60 (*anceps*); acute angled, 59; obtuse angled, 58; winged, 57 (*alatus*); leaf-like (*foliaceus*); imbricated, 48, 89.



The BUD, or LEAFBUD (*Gemma*; *Bulbus*, SB, ix.), is subterranean (*hypogæa*); axillary, SB, xiii.; supra axillary, or above the axil.

The LEAF (*Folium*, *Frons*, *Phylloodium*, *Squama*) is either deciduous or evergreen (*sempervirens*); fleshy (*succulentum*), or thin (*tenue*); papery (*papyraceum*), or like parchment (*pergameneum*); spiny (*spiniosum*), or unarmed (*incerne*); stipulate, or exstipulate; radical (*radicale*), proceeding from the crown of the root; or cauline (*caulinum*), proceeding from the stem; SIMPLE (*simplex*), or COMPOUND (*compositum*).

SIMPLE LEAVES are :

- | | |
|---|--|
| orbicular, 69; | sinuate, 92; |
| roundish, 68 (<i>subrotunda</i>); | dentato-sinuate; |
| ovate, 67; | lyrate; |
| oblate, 66; | sinuate backwards, 76 (<i>retrosum-sinuata</i>); |
| oval, or elliptical, 77; | runcinate, 76; |
| oblong, 75; | repand, 79; |
| lozenge-shaped, 74 (<i>rhomboidalia</i>); | crisp, 95. |
| lanceolate, 73; | scymitar-shaped, 98 (<i>acinaciformia</i>); |
| spathulate, 82; | hatchet-shaped, 100 (<i>dolabriformia</i>); |
| linear, 72; | deltoid, 99; |
| subulate, 71. | channelled (<i>canaliculata</i>); |
| kidney-shaped, 70 (<i>reniformia</i>); | furrowed (<i>sulcata</i>); |
| cordate, 65; | terete, 64; |
| triangular, 78; | veiny, 80 (<i>venosa</i>); |
| sagittate, 78*; | ribbed, 94 (<i>neriosa</i>); |
| hastate, 88; | connate, 105; |
| oblique, 87. | perfoliate; |
| lobed; 3-lobed, 86; &c. | amplexicaul, 96; |
| 5-angled, 83 (<i>quinquangularia</i>); | decurrent, 97; |
| erose, 84; | fasciculate, 114; |
| palmate, 85, 90; | imbricate, 89; |
| pedate, 108; | peltate, 81; |
| lacinate, 91; | equitant; sword-shaped (<i>ensiformia</i>), <i>i. c.</i> , |
| pinnatifid, 93; | having the form of the blade of a |
| fiddle-shaped 101 (<i>panduriformia</i>); | straight sword. |

COMPOUND LEAVES are :

- | | |
|--|--|
| binate, 103; | interruptedly; decurrently (<i>decursivè</i>); |
| conjugate, 103; | with joints, 112 (<i>articulate</i>); |
| ternate with sessile leaflets (<i>t. foliolis sessilibus</i>); ternate with stalked leaflets, 104 (<i>t. fol. petiolatis</i>); | biterminate, 111; |
| digitate 102; | triterminate, 113; |
| pinnate, unequally, 107 (<i>cum impari</i>); | bipinnate, 115; |
| abruptly, 106; alternately, 109; in- | tripinnate, 116; |
| | supradecomound, 110. |

The CIRCUMSCRIPTION of a leaf is its general outline, indentations being disregarded.

STIPULES are described by the same terms as leaves, when their quality is the same. They are also free (*liberæ*) when separate from the petiole: adnate when united to the petiole; lateral; axillary; supra-axillary; foliaceous when like leaves; scarious when membranous; ochreate; interpetiolar; intrapetiolar; connate.

The PETIOLE (*Petiolus*) is leafless (*aphyllus*); channelled (*canaliculatus*); bordered (*marginatus*); leafy (*foliaceus*); winged (*alatus*); jointed (*articulatus*); compressed; inflated (*ventricosus*); amplexicaul; eared (*auriculatus*); cirrhose when ending in a tendril; mucronate when ending in a hard point. The VAGINA, a thin petiole which rolls round the stem, is entire (*integra*) when quite closed up; or slit (*fissa*) when open on one side.

BRACTS (*Bractea*; *Bractcola*) are leafy, coloured, persistent, deciduous (*caducæ*), crested (*cristatæ*), as in *Melanopyrum*; flat, or keeled (*carinata*); folded flat (*conduplicatæ*); and so on. The COMA, or tuft, appearing beyond the flowers, is coloured or herbaceous. The SPATHE is hooded (*cucullata*, *convoluta*), as in *Arum*; membranous, as in *Crocus* and *Narcissus*; 1-valved if single, 2 or 3-valved if consisting of 2 or 3 bracts. The INVOLUCRE is monophyllous when all the bracts are united by their edges, polyphyllous when distinct; imbricated; recurved; calyculate when the outer bracts are suddenly much shorter than the inner; general when it belongs to the whole inflorescence, partial when proper to a portion only of the inflorescence.



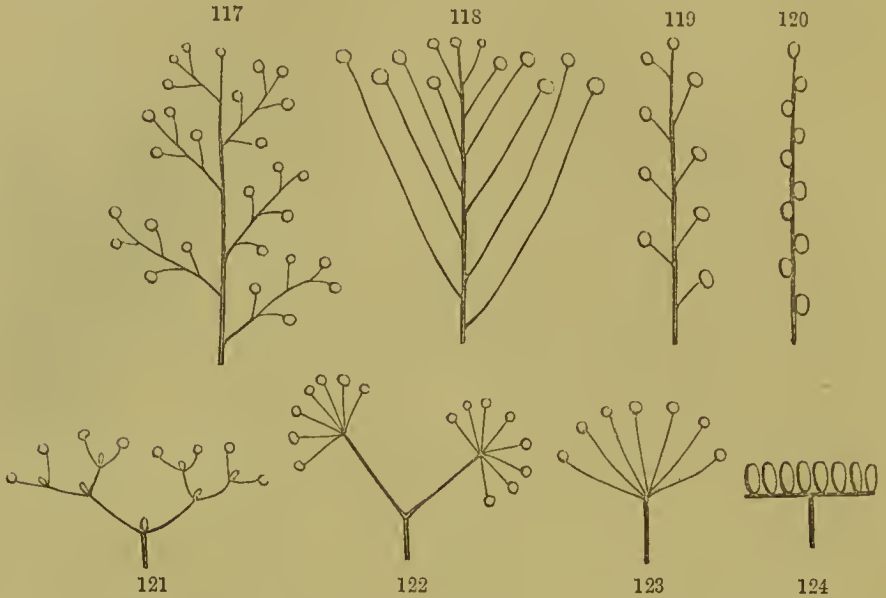


FLOWERS are :

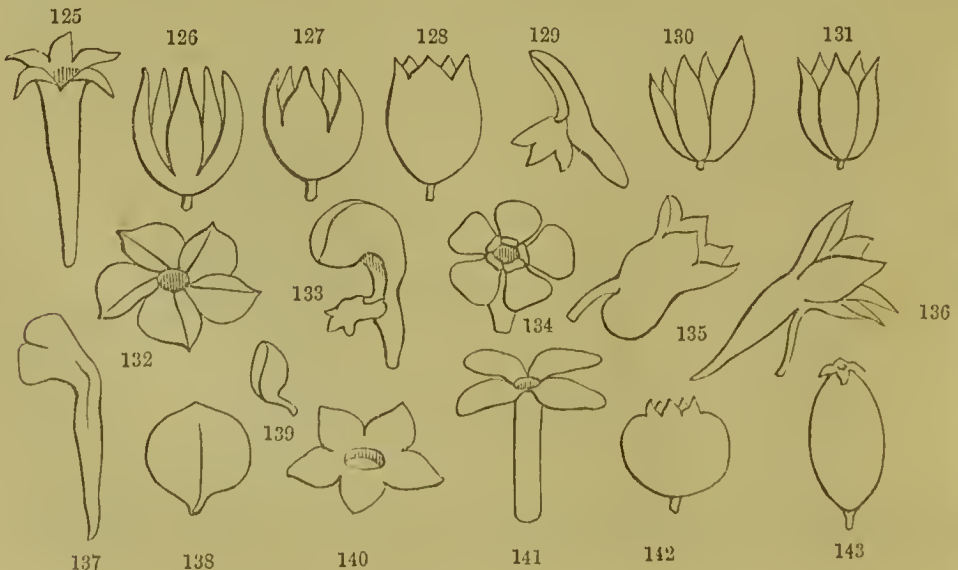
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|---|-------------------------|
| loose (<i>laxi</i>); | irregular; |
| close (<i>densi</i>); | symmetrical; |
| erect; | unsymmetrical; |
| nodding (<i>nutans</i>); | monochlamydeous; |
| pendulous; | dielhamydeous; |
| secund; | achlamydeous, or naked; |
| verticillate; | apetalous; |
| remote; | monœcious; |
| depauperate, when they become abortivo; | diœcious; |
| regular; | polygamous. |

The INFLORESCENCE (*Spica*, SB, xxxviii.; *Capitulum*, SB, clix.; *Racemus*, SB, xxxvii.; *Corymbus*, SB, c; *Umbella*, SB, xxxix. lx.; *Panicula*, SB, ccxxxvii.; *Cyma*, SB, xli, each forming its own adjective, as spicate, 120; capitate, 124; racemose,

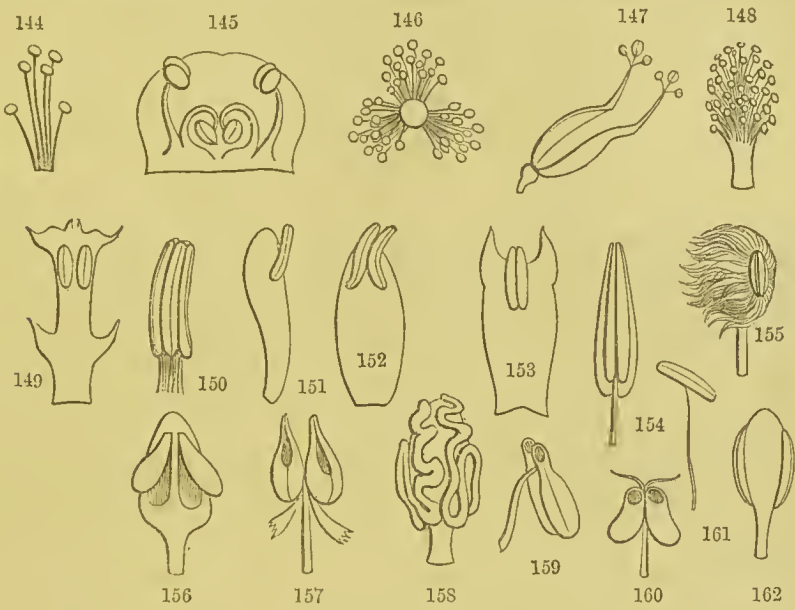
119; eorymbosc, 118; umbellate, 122, 123; paniculate, 117; eymose, 121;) is dense; loose (*effusa*); terminal; axillary; opposite to the leaf (*oppositifolia*); erect; drooping; scorpioid, or gyrate.



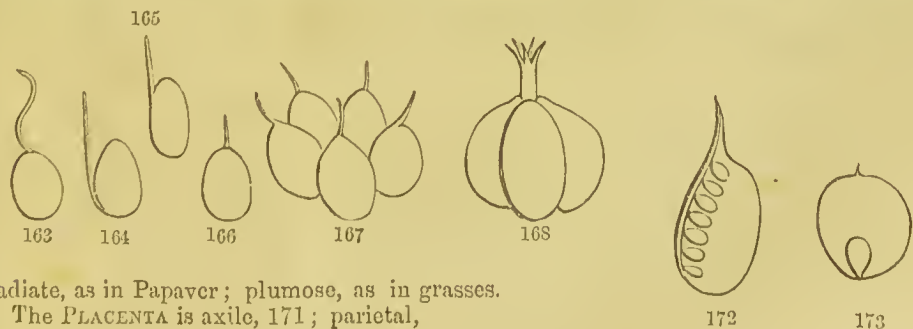
The CALYX and COROLLA (*Perianthium*, when the two become undistinguishable). The terms used in describing one of these organs are for the most part applicable to the other. They are regular, 131; irregular, 130; labiate, 129; ringent; galeate, 133; dentate, 128; cleft, 127 (*fissus*, *bifidus*, *trifidus*, &c.); parted, 126 (*bipartitus*, *tripartitus*, &c.); Monosepalous, —petalous; polysepalous, —petalous; valvate, or imbricated; ventricose, or inflated. Persistent; deciduous. Tubular; prismatical, or angular; rotate, 140; campanulate, 128; globose, 142; urceolate, 143; funnel-shaped, 125 (*infundibuliformis*); salver-shaped, 141 (*hypocrateriformis*); calcarate, 136; saccate, 135; simple at the base. The CALYX is also superior, inferior, half inferior, obsolete when scarcely discoverable. The COROLLA is also fornicate, 134, having fornicies or eoneave scales at its orifice; contorted, 132, when its lobes are unequal-sided. Its PETALS are sessile, 138; unguiculate, 137; spoon-shaped, 139 (*cochleata*), as in *Rhamnus*, or scale-like (*squamiformis*), as in *Ribes*; cruciate as in *Crucifers*.



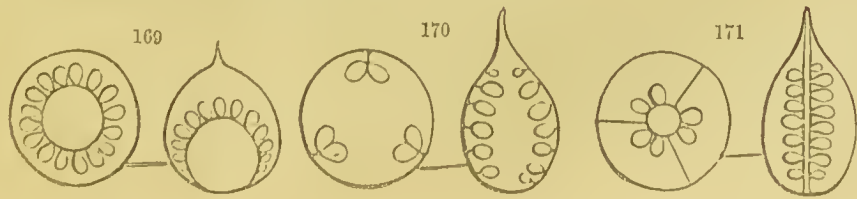
STAMENS are definite or indefinite. Hypogynous; perigynous; epigynous; epipetalous. Monadelphous, 148; diadelphous, 147; polyadelphous, 146; didynamous, 145; tetradynamous, 144. Exserted; included; straight (*recta*); declinate. The FILAMENT is short; long; filiform; petaloid, 151, 152, 153; unidentate; bidentate, 153; glandular; stipose, 155. The ANTHERS are 1-celled; 2-celled, 154; 4-celled. Turned inwards (*introrsæ*); turned outwards (*extrorsæ*). Innate 154; adnate, 149, 162; versatile, 161. Free (*liberæ*); syngenesious, 150. Straight; sinuous, 158. Aristate, 160; corniculate; crested, 157 (*cristatæ*). Opening by pores, 157, 159, 160 (*porosæ*); by recurved valves, 156 (*valvis recurvis dehiscentes*).



The OVARY (*Ovarium*; *Carpellum*) is monogynous, digynous, trigynous, &c. Superior, SB, xlv.; inferior, SB, xlv.; half-inferior. One-celled (*uniloculare*); 2-3-many-celled (*bi-tri-multiloculare*). One-seeded (*monospermum*); 2-3-many-seeded (*bi-tri-polyspermum*). Entire, lobed. Syncarpous, 168; apocarpous, 167. CARPELS are definite, indefinite; united, 168; disunited, 167; spiked, SB, xci.; verticillate,*SB, lxi. The STYLE is terminal, 166; lateral, 165; basal, 164 (*basilaris*). Filiform; clavate; sigmoid, 163; subulate; petaloid. Persistent; deciduous. The STIGMA is simple, bifid, trifid, &c., capitate; pulley-shaped (*trochleare*). Terminal; lateral; transverse, as in *Iris*;



radiate, as in *Papaver*; plumose, as in grasses. The PLACENTA is axile, 171; parietal,



170; basal, 173; sutural, 172; free central, 169 (*libera centralis*). OVULES are erect; ascending; pendulous; suspended; horizontal. Anatropeal, 174; orthotropeal, 175. Definite; indefinite.



174 175

FRUIT is indehiscent (*Achænium*, *Nux*, *Drupa*, *Caryopsis*, *Bacca*, *Samara*, SB, lxxv.; *Lomentum*, SB, cxxi. 1), or dehiscent (*Capsula*; *Siliqua*, SB, lxxiii.; *Legumen*, *Follicle*, SB, lxxxviii.; *Pyxis*, SB, lxxiv.). It dehisces by pores or valves; its dehiscence is loculicidal, 177; septicidal, 178; septifragal, 176. It is also naked; coronetted (*coronatus*); corticate when the outer layer separates spontaneously. Monococcons, dicoccons, &c., when it splits spontaneously in the septicidal manner.



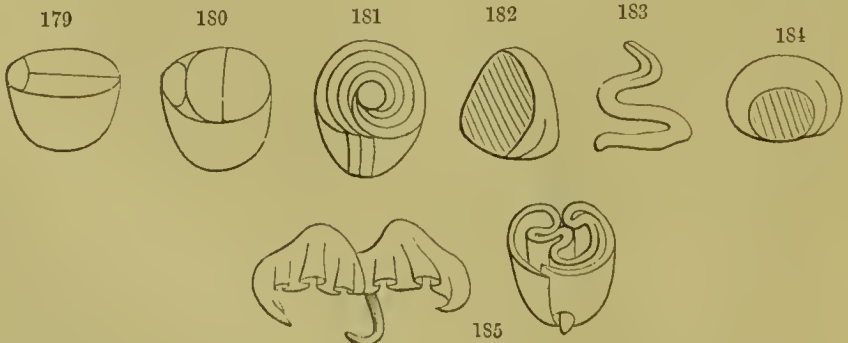
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[In Umbellifers and Composites special terms are employed, some of the more important of which are the following:—Among UMBELLIFERS, the achænum divides into two carpella (*mericarpia*), which are half-terete; hemispherical; compressed laterally; compressed dorsally; rostrate. Their ridges (*juga*) are filiform; winged; wavy; corky (*suberosa*); marginal; entire; lacerated; fringed; membranous. The vittæ are commissural when on the commissure. The albumen is solid or convolute. See SB, 67.—Among COMPOSITES the achæne is beaked (*rostratum*); erostrate, or beakless; crowned (*coronatum*); sessile; stipitate; terete; top-shaped (*turbinatum*); furrowed; winged; bald (*calvum*) when there is no pappus. The PAPPUS is sessile; stipitate; membranous; paleaceous; awned (*aristatus*); setaceous; feathery (*plumosus*); rough (*scaber*); hair-like (*pilosus*); persistent; deciduous. The receptacle is paleaceous; naked; hairy; fringed; alveolate; flat; concave; conical. See SB, 82.)]

In the SEED the same terms are employed as in the ovule, when referring to position, number, structure, or placentation. Seeds are also terete; spherical; angular; winged (*alata*); naked; pitted (*scrobiculata*); netted (*reticulata*); smooth; striated; polished (*polita*, *nitida*); hairy; shaggy (*villosa*); cottony (*lanata*); brittle (*crustacea*); comose (*comata*) having long hairs at one end; like sawdust (*scobiformia*), as in Orchis; albuminous; exalbuminous. The ALBUMEN is horny (*corneum*); fleshy (*carnosum*); oily (*oleosum*); mealy (*farinaceum*); solid; ruminant; scanty; copious. The EMBRYO is monocotyledonous; dicotyledonous; polycotyledonous; acotyledonous, as in Cuscuta; straight; annular, 184; spiral, 183; external, or lateral, 182; internal; minute; large; in the axis (*axilis*). The RADICLE is directed to the apex of the fruit (*superior*); or towards the base (*inferior*); or vague. The COTYLEDONS are semiterete; plano-convex; flat (*planæ*); spiral, 181; channelled (*conduplicatæ*); crumpled, 185 (*contortuplicatæ*), as in Convolvulus; accumbent, 179, or incumbent, 180, in Crucifers.



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CHAPTER VII.

EXAMPLES OF TECHNICAL DESCRIPTION FOR EXERCISE.

THE following examples have been prepared from plants so common that all may obtain them, in order that a student may never be at a loss for materials for exercise. It will be seen that although they follow in general the plan pointed out at p. 9. yet they have been made to differ among themselves in small details. This shows the student that he is not absolutely bound down to an inexorable routine, but that a deviation from the ordinary rules of description is allowable within certain limits, as for example is to be seen in *Daucus Carota*, p. 24; and that even the natural sequence of matter may be to some extent disregarded.

As soon as the student feels strong enough to attempt description, and has mastered the instructions in chapters I. to V., he should take some simple case, such as that of *Stellaria media*, or *Syringa vulgaris*, and carefully compare its description in this little work with the plant itself. Having done this he should shut his book, and himself describe the plant as he best can. Afterwards upon comparing his own description with that prepared as his guide, he will see what he has misunderstood or overlooked. And if this is practised with moderate diligence the important art of Botanical description will be speedily mastered sufficiently for all common purposes.

RANUNCULUS BULBOSUS: Buttercups.

THALAMIFLORAL EXOGENS.

Nat. Order, RANUNCULACEÆ, or CROWFOOTS.

ROOTS nearly simple, fibrous, from the base of a roundish perennial *caulm*.

STEM erect, silky, pale green, slightly branched, and angular.

LEAVES pale green, very hairy; RADICAL triternately pinnatifid, with a somewhat oblong circumscription, with long slender petioles dilated at the base into a membrane; CAULINE like the radical, but with fewer divisions, narrower lobes, and much shorter petioles more membranous at the base; the uppermost either opposite or alternate and tripartite.

FLOWERS terminal, solitary, on long angular and furrowed peduncles.

SEPALs 5, oval, shaggy, coloured at the edge, reflexed.

PETALS 5, roundish, concave, much larger than the sepals, as if varnished on the upper side, with a small wedge-shaped scale at the base.

STAMENS indefinite, hypogynous; *filaments* yellow, very narrow, spathulate; *anthers* linear, extrorse, adnate.

CARPELS indefinite, disunited, collected in a nearly spherical head, pale green; *ovaries* smooth, compressed; *stigmas* sessile, linear, recurved; *ovules* solitary, ascending.

ACHENES brown, compressed, smooth, monospermous.

SEED ascending; *embryo* minute, in firm fleshy albumen; *radicle* inferior.

HYPERICUM PERFORATUM: Pierced St. John's Wort.

THALAMIFLORAL EXOGENS.

Nat. Order, HYPERICACEÆ, or TUTSANS.

ROOT woody, somewhat creeping.

STEM bushy, corymbose, much branched, terete, with two opposite ribs.

LEAVES very numerous, opposite, elliptical, obtuse, about 3-ribbed, filled with numerous transparent cysts, which give them a dotted appearance.

FLOWERS in threes, at the ends of the numerous corymbose branches; that in the middle nearly sessile, the others pedicellate.

SEPALs 5, linear, cuspidate, smooth.

PETALS 5, oblong, unequal-sided, bright yellow, with numerous marginal and immersed black glands.

STAMENS indefinite, hypogynous, slightly triadelphous; *filaments* filiform; *anthers* roundish, with a black gland on the connective.

OVARY superior, oblong, 3-celled, with polyspermous axile placenta; *styles* 3, filiform, spreading; *stigmas* simple.

CARDAMINE PRATENSIS: Cuckoo Flower.

THALAMIFLORAL EXOGENS.

Nat. Order, BRASSICACEÆ, or CRUCIFERS.

ROOTS fibrous, slightly branched; proceeding from the sides of a half-subterranean, perennial, green *tuber*, whose sides are marked by wide scars and very short tooth-like branches.

STEM erect, annual, smooth, terete, about a foot high.

LEAVES: RADICAL on long stalks, thin, dark green, distantly pinnate; *leaflets* stalked, in 2 to 4 pairs, sometimes alternate, wavy, orbicular, entire, angular, or toothed; the terminal one much larger than the other; CAULINE more closely pinnate in from 5 to 7 pairs with an odd one; *leaflets* linear, obtuse, entire.

RACEMES terminal and axillary, 2 or 3, nodding, longer than the leaves, somewhat corymbose, ebracteate.

SEPALS 4, oblong, obtuse, membranous at the edge: the two opposite slightly saccate.

PETALS 4, cruciate, pale lilac or white, veiny, with a slight tooth on one side of the uguis.

STAMENS tetradynamous, hypogynous, erect, longer than the calyx; *filaments* subulate, rigid, somewhat herbaceous; the two lateral much shorter than the others; *anthers* ovate, innate, erect, opening longitudinally: those of the longer filaments extrorse, of the shorter introrse.

OVARY superior, terete, as long as the longest filaments, 2-celled: *placentæ* 2 in each cell, next the dissepiment, parietal, polyspermous: *style* very short; *stigma* capitate.

DISK: four minute green glands; one surrounding the base of each shorter stamen, one free, between the bases of each pair of longer stamens.

FRUIT [so rarely produced that I never saw a specimen of it. That of the *Cardamine hirsuta* is here described instead.] SILIQUA linear, compressed, slightly torulose; *valves* thin, flat.

SEEDS oblong, lenticular, bright brown, arranged in a single line, suspended from very short funicles.

EMBRYO exalbuminous, with a superior radicle as long as the accumbent cotyledons.

STELLARIA MEDIA: Chickweed.

THALAMIFLORAL EXOGENS.

Nat. Order, CARYOPHYLLACEÆ, or SILENADS.

ROOT annual, with numerous small fibres.

STEM of very variable length, copiously branched from the bottom, loosely spreading, leafy, brittle, smooth, except a hairy unilateral line, which proceeds from the axil of one leaf to the junction of the leaves above, and then exchanges at every joint into the axil of another leaf.

LEAVES stalked, ovate, acute, wavy, with channelled fringed petioles as long as the laminæ.

FLOWERS small, solitary, axillary; on slender, erect, saggy peduncles, which are not half the length of the leaves, and are curved downwards and much lengthened after flowering.

SEPALS 5, ovate, obtuse, bright green, with a membranous margin and shaggy back.

PETALS 5, white, bipartite, shorter than the sepals.

STAMENS usually 4, but also 3, 5, or 10, hypogynous, each with a gland at the base on the outside; *filaments* filiform, the length of the ovary; *anthers* roundish, pale purple, 2-celled, innate, dehiscing longitudinally.

OVARY superior, oblong, 1-celled, with a free polyspermous central placenta; *stigmas* 3, linear, spreading, sessile.

CAPSULE membranous, half six-valved, enclosed in the calyx.

SEEDS about 6, pale brown, round, on long funicles, compressed, with numerous circular scabrous striæ. *Testa* crustaceous.

EMBRYO terete, annular, round mealy albumen; *radicle* inferior.

FRAGARIA VIRGINIANA : The Garden Strawberry.

CALYCIFLORAL EXOGENS.

Nat. Order, ROSACEÆ, or ROSEWORTS.

STEM woody, perennial, subterranean, covered with brown scales, throwing out strong, perpendicular, yellowish, fibrous roots ; and long weak runners rooting at the joints.

LEAVES all radical, ternate, dark green, somewhat shining, very coarsely serrated ; with strong parallel oblique veins, silky beneath ; *leaflets* nearly sessile, roundish oblong, entire towards the base, shorter than the semiterete hairy petioles ; *stipules* membranous, lanceolate, acuminate, half adnate.

SCAPES erect, terete, silky, branched from near the middle, and corymbosely paniced. BRACTS herbaceous, oblong, close-pressed, bifid, the lowest often monophyllous, the uppermost acuminate, entire.

CALYX herbaceous, flat : *sepals*, in two whorls of 5 each ; the outer oblong, frequently bidentate, the inner triangular, acuminate, entire.

COROLLA polypetalous, white, larger than the calyx ; *petals* 5, roundish, inserted upon the calyx between the inner sepals.

STAMENS indefinite, perigynous : *filaments* short, stiff ; *anthers* oval, cordate, flat, dehiscing at the edges.

CARPELS indefinite, distinct, upon an oblong elevated torus ; *ovaries* oblong, rather oblique ; *ovules* solitary, ascending ; *styles* erect, filiform, yellowish ; *stigmas* simple.

FRUIT a large succulent conical or hemispherical torus, having a persistent calyx at the base, and bearing on its surface the half immersed wrinkled achenes. *Seed* solitary ascending ; *embryo* exalbuminous, with plano-convex *cotyledons*, and a short inferior *radicle*.

[OBS. This description applies to the common state of the Garden Strawberry, when nearest its original state ; but its varieties are very numerous, differing not only in the form, colour, and quality of the fruit, but in the form of the leaflets, their surface and colour, and in the degree of hairiness of all the parts.]

CRATÆGUS OXYACANTHA : The Hawthorn tree.

CALYCIFLORAL EXOGENS.

Nat. Order, ROSACEÆ, § POMEÆ.

A small TREE, with a round entangled branching head ; *trunk* with numerous irregular longitudinal fissures ; *branches* dark grey, smooth, with numerous simple spines ; *twigs* pale green, terete, smooth.

LEAVES alternato, deciduous, stalked, 3- to 5-lobed, with the lobes apiculate, often serrated and incised ; smooth except a few silky hairs chiefly along the midrib on the underside ; *petioles* slender, channelled, rather shorter than the lamina ; *stipules* free, leafy, acuminate, those of the first leaves falcate, coloured on the inner edge, the rest linear-lanceolate, glandular at the edge, sometimes half-hastate at the base.

CORYMBES axillary and terminal, paniced, silky, with setaceous coloured deciduous *bracts*.

CALYX superior, 5-lobed ; the lobes triangular, reflexed ; the tube, obconical woolly.

PETALS 5, roundish, concave, inserted into the edge of the tube of the calyx, imbricated in æstivation.

STAMENS indefinite (about 20) perigynous ; *filaments* white, filiform, curving inwards ; *anthers* 2-celled, roundish, innate, reddish purple.

OVARY inferior, wholly buried in the tube of the calyx, 1-2-celled ; *ovules* 2 in each cell, ascending, anatropal ; *styles* 1 or 2, filiform, smooth ; *stigmas* simple.

[OBS. This description applies to the common form of the Hawthorn ; but it varies much in the form of its-leaves, their downiness, and other small details.]

DAUCUS CAROTA: The Wild Carrot.

CALYCIFLORAL EXOGENS.

Nat. Order, APIACEÆ, or UMBELLIFERS.

ROOT biennial, slender, tapering, yellowish, aromatic, and sweetish.

STEM 2 or 3 feet high, branched, erect, leafy, hairy, scabrous.

LEAVES alternate, on broad, concave, ribbed footstalks, bipinnate, with narrow, very acute, entire or cut, pilose segments, rough at the edge.

UMBELS terminating long leafless branches, solitary, large, white, except one central neutral flower, which is blood-red.

BRACTS OF GENERAL INVOLUCRUM pinnatifid, setaceous, not so long as the umbel; of the PARTIAL, simple, or 3-cleft, membranous at the edges.

CALYX obsolete.

PETALS 5, obovate, flat, unequal; the larger next the circumference of the umbel.

STAMENS 5, inserted beneath a double epigynous disk; *filaments* filiform, incurved; *anthers* oblong, 2-celled, dehiscing longitudinally.

OVARY inferior, roundish, striated, hispid, 2-celled; *ovules* solitary, pendulous; *styles* 2, erect, filiform, shorter than the stamens; *stigmas* simple.

FRUIT (protected by the incurvation of all the flower-stalks, by which the umbels are rendered hollow, like a bird's nest. *Smith*), compressed from the back, pale dull brown, oval; of the *primary* ridges, which are narrow, 3 bristly, near the middle of the convex back, the other 2 on the edge of the narrow commissure; *secondary* deeper and irregularly split into setaceous lobes; *vittæ*, 1 under each secondary ridge, and 2, more slender, on the plane of the commissure.

[OBS. 1. The cultivated Carrot, which is a domesticated variety of this, has broader leaves, and differs in some other small particulars.]

[OBS. 2. In examining the fruit of any Umbellifer, obtain a thin transverse slice, just when it is beginning to harden, place it in water, and view it by transmitted light. If the fruit is old and hard, it must be boiled for two or three minutes before being sliced.]

ÆTHUSA CYNAPIUM: Fool's Parsley.

CALYCIFLORAL EXOGENS.

Nat. Order, APIACEÆ, or UMBELLIFERS.

ROOT annual, tapering, whitish.

STEM erect, dark lurid green, often purplish, fetid, terete, striated, leafy, a foot high.

LEAVES smooth, on short sheathing footstalks, ternate, with slender-stalked, tripartite, cut, somewhat cuneate lobes.

UMBELS stalked, terminal, spreading and flattish.

GENERAL INVOLUCRE 0; PARTIAL one-sided, of 3 linear, acute, pendulous bracts.

FLOWERS small, pure white, partially abortive.

CALYX obsolete.

PETALS 5, obcordate, with the points inflexed, those near the circumference largest.

STAMENS 5, epigynous, incurved.

OVARY inferior, oblong, striated, 2-celled, smooth; *ovule* solitary, pendulous; *styles* 2, spreading, short, filiform; *stigmas* simple.

FRUIT pale brown, ovate, 2 lines long, without any remains of a calyx; *ridges* thick, corky, sharp, the dorsal ones rather the narrowest; *vittæ* under the furrows solitary, very slender, upon the commissure 2, blood red, curved, more distant at the base than at the apex; *albumen* terete.

SYRINGA VULGARIS : The Lilac Bush.

COROLLIFLORAL EXOGENS.

Nat. Order, OLEACEÆ, or OLIVEWORTS.

A large branching SHRUB or small tree, with a pale brown bark ; *branchlets* opposite, smooth, slightly quadrangular.

LEAVES opposite, exstipulate, roundish-cordate, very acute, thin, smooth, rather longer than the linear channelled petiole.

PANICLES terminal, pyramidal, compact, many-flowered, slightly downy : *General Bracts* lanceolate herbaceous ; *partial* subulate, or none.

CALYX herbaceous, cupshaped, 4-toothed, minutely glandular.

COROLLA monopetalous, hypocrateriform, much longer than the calyx ; the limb 4-lobed, valvate in æstivation.

STAMENS 2, within the tube of the corolla, epipetalous, alternate with the lobes ; *anthers* oblong, sessile, dehiscing longitudinally.

OVARY superior, ovate, seated in a fleshy disk, 2-celled ; *ovules* in pairs, pendulous ; *style* clavate ; *stigmas* 2, linear, decurrent.

CAPSULE woody, compressed, obovate ; *valves* 2, navicular, loculicidal. SEEDS solitary, thin, oblong, winged.

ILEX AQUIFOLIUM : The Holly tree.

COROLLIFLORAL EXOGENS.

Nat. Order, AQUIFOLIACEÆ, or HOLLYWORTS.

An evergreen TREE. *Branches* dull green, slightly obtusangular, smooth.

LEAVES alternate, elliptical, wavy, veinless, smooth, shining, spinoso-dentate, with a cartilaginous edge ; *petioles* short, terete, minutely tomentose.

FLOWERS nearly sessile, axillary ; 3 or 4 together.

CALYX inferior, 4 parted ; with rounded downy lobes.

COROLLA white, monopetalous, or polypetalous, rotate, 4-lobed ; with oblong imbricated lobes.

STAMENS 4, inserted on the corolla between the lobes, or hypogynous ; *filaments* stiff, erect, filiform ; *anthers* ovate, obtuse, 2-lobed, innate, dehiscing longitudinally.

OVARY superior, roundish, naked, deep green, 4-celled ; *ovules* solitary suspended ; *stigmas* 4, simple, sessile, confluent. [N.B. The ovary is often abortive, and 4-lobed, without stigmas.]

PRIMULA ACAULIS : The Primrose.

COROLLIFLORAL EXOGENS.

Nat. Order, PRIMULACEÆ, or PRIMWORTS.

ROOTS fibrous, rather strong and fleshy, proceeding from the sides of a short, very scaly, perennial stem.

LEAVES numerous, all radical, obovate-oblong, rugose, unequally toothed, soft and somewhat downy, narrowing gradually downwards into broad short footstalks.

FLOWERS axillary, solitary, with terete, shaggy peduncles, about half the length of the leaves, curving downwards after flowering.

CALYX tubular, prismatical, 5-fid, a little contracted at the orifice, as long as the tube of the corolla, with acuminate teeth, and the angles covered with long soft hairs.

COROLLA large, monopetalous, hypocrateriform, as long as the calyx, or a little longer ; *limb* 5-lobed, equal, sulphur-coloured, with a bright yellow spot at the base of each of the lobes, which are flat, obcordate, and nearly as long as the tube.

STAMENS 5, inserted about the middle of the tube, opposite the lobes of the corolla, nearly sessile ; *anthers* 2-celled, innate, ovate, introrse, dehiscing longitudinally.

OVARY superior, roundish, 1-celled, with a polyspermous free central placenta ; *style* filiform, scarcely reaching the stamens ; *stigma* capitate.

CAPSULE globular, enclosed in the persistent calyx, 10-furrowed, 5-valved at the apex ; the valves usually bidentate.

SEEDS indefinite, roundish, depressed, somewhat angular in consequence of mutual pressure, finely dotted.

EMBRYO dicotyledonous, terete, lying in the axis of fleshy albumen, across the hilum.

MYOSOTIS PALUSTRIS: Forget-me-not.

COROLLIFLORAL EXOGENS.

Nat. Order, BORAGINACEÆ, or BORAGEWORTS.

RHIZOMES long, creeping, blackish, with numerous tufts of strong fibres.

HERB bright green, rather succulent, from 6 to 12 or 18 inches high.

STEMS ascending obliquely, terete, branching, leafy, either nearly smooth or clothed with more or less spreading bristly hairs.

LEAVES sessile, nearly uniform, elliptic-oblong, bluntish, $1\frac{1}{2}$ or 2 inches long, clothed on both sides with small close-pressed bristles, which scarcely render them rough to the sight or touch.RACEMES scorpioid, many-flowered, 2 or 3 together, on a terminal leafless stalk or elongation of each branch; each general and partial stalk, as well as both sides of the calyx, clothed with erect, or close-pressed, short, straight, simple, rigid, pale, uniform, bristly hairs; *pedicels* at first crowded into a dense revolute spike, which unrolls gradually, and after flowering is greatly elongated, the stalks spreading almost horizontally as the achenes ripen, forming a very lax straight raceme.CALYX about half the length of each pedicel, after the flower is past, bell-shaped at the base; the *limb* divided half-way down into 5 broad, triangular, rather expanding segments.COROLLA: *tube* about as long as the calyx, whitish; *limb* longer, horizontal, pink before expansion, then of a beautiful enamelled sky blue, with white elevated ribs at the base of each rounded, scarcely notched segment; the *fornices* yellow.STAMENS 5, alternate with the lobes of the corolla, included within the tube; *anthers* purplish brown, oblong, 2-celled.OVARY superior, 4-lobed; *style* basal, the length of the tube of the corolla; *stigma* capitate, umbilicated. (*Smith, a little modernised.*)ACHÆNES ovate, obtuse, blackish, highly polished, erect, rounded at back, slightly keeled in front, with a small scar at the base, by which they are attached rather obliquely to the *torus*.SEED solitary, fixed by the middle, exalbuminous, dicotyledonous, with a superior *radicle*.

VERONICA CHAMÆDRYS: The Germander Speedwell.

COROLLIFLORAL EXOGENS.

Nat. Order, SCROPHULARIACEÆ, or LINARIADS.

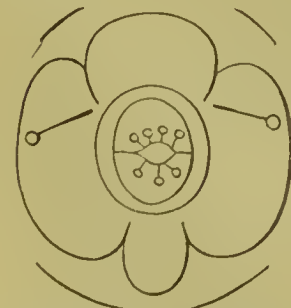
STEMS ascending, branched, terete, with two hairy lines on opposite sides.

LEAVES opposite, sessile, ovate, slightly cordate, obtuse, rugose, pilose, coarsely serrated.

RACEMES axillary, erect, drooping at the point; *peduncle* naked, twice as long as the leaves; *bracts* ovate, acute at base, entire, herbaceous, ciliated, rather shorter than the hairy pedicels.

CALYX spreading, 4-parted, rather unequal, with two of the lobes larger than the others.

COROLLA rotate, light blue with darker veins, unequally 4-parted; lobes roundish, two external and larger, of the two inner the smaller alternate with the two larger lobes of the calyx; tube hairy inside.

STAMENS 2, spreading, at the base of the larger of the two inner lobes of the corolla; *filaments* violet, clavate; *anthers* innate, 2-celled, dehiscing longitudinally.OVARY superior, compressed laterally, in a yellow annular disk; cells 2, anticous and posticous; *ovules* several, axile; *style* filiform, declinate; *stigma* capitate.

[Obs. The accompanying diagram, which represents this structure, is a good example of the utility of contrivances of the kind, in making which students should constantly exercise themselves. See SB, lxxviii. and lxxix.]

LAMIUM ALBUM: White Deadnettle.

COROLLIFLORAL EXOGENS.

Nat. Order, LAMIACEÆ, or LABIATES.

STEM creeping, rooting at the joints, decumbent, quadrangular, with thickened angles, fistular, 1 to 2 feet high, slightly hairy.

LEAVES with a heavy smell, opposite, rugose, coarsely serrated, hairy; the lower cordate-ovate, obtuse, about as long as the linear channelled petioles; the upper larger, nearly sessile, acuminate.

FLOWERS about 6, sessile in the axils of all the upper leaves.

CALYX monosepalous, campanulate, irregular, pilose, green, purple at base, with a wide 5-cleft limb, having triangular setaceous lobes, of which the uppermost, at the back of the galea, stands apart from the others.

COROLLA large, white, monopetalous, bilabiate, with a ventricose tube rather longer than the calyx; scabrous inside down to an oblique ring of hairs which stands over the ovary; upper lip galeate, entire, villous, arching over the lower lip, which is 3-lobed, with roundish erect cuspidate lateral lobes, and a deflexed two parted middle lobe rounded at the sides.

STAMENS 4, didynamous, epipetalous, beneath the galea; *filaments* downy and glandular; *anthers* dark purple, with a wide shaggy connective, and horizontal lobes, dehiscing longitudinally; *pollen* yellow.

OVARY truncate, 4-lobed, pale green, seated in a pale fleshy cup-like disk; *ovules* solitary, erect; *style* basal, terete, thickened upwards, lying between the filaments beneath the galea, smooth; *stigma* acutely bifid.

ACHÆNES 4, cuneate, as long as the tube of the persistent calyx, triangular, rounded at the back, truncate and concave at apex, smooth, shining; *seed* solitary, erect; *embryo* exalbuminous, with plano-convex *cotyledons* and a short inferior radicle.

NEPETA GLECHOMA: Ground Ivy.

COROLLIFLORAL EXOGENS.

Nat. Order, LAMIACEÆ, or LABIATES.

STEMS numerous, slender, quadrangular, purplish, with a few recurved minute hairs; decumbent and rooting at the joints, which have a fringe of long hairs between the leaves.

LEAVES opposite, the lower reniform, the upper roundish-cordate, crenate, somewhat rugose, hairy and ciliated, rather longer than the channelled petioles.

FLOWERS in threes, axillary, nearly sessile: *bracts* scaly, acute.

CALYX cylindrical, slightly irregular, striated, glandular, hairy; with 5 ovate cuspidate teeth, much shorter than the tube of the corolla.

COROLLA monopetalous, slightly 2-labiate, deep violet, with the tube somewhat ventricose in front; *lobes* rounded, *upper lip* flat, 2-lobed, *lower* 3-lobed: the middle lobe broader and retuse, with a few hairs at its base.

STAMENS didynamous, distinct, included, two much shorter than the others (often abortive).

OVARY 4-lobed, on a fleshy disk, the lobes roundish; *style* filiform, basal, ascending, lying in a furrow along the middle of the upper lip of the corolla; *stigma* bifid, acute.

ACHÆNES 4, oblong, smooth, very minutely punctured.

BELLIS PERENNIS: The Daisy.

COROLLIFLORAL EXOGENS.

Nat. Order, ASTERACEÆ, or COMPOSITES.

ROOT perennial, of numerous perpendicular, nearly simple fibres.

STEM very short, branching at the crown and spreading horizontally.

LEAVES numerous, all radical, spreading, horizontal, obovate, acutely crenate, deep green, slightly hairy especially beneath, tapering into a thin channelled fringed petiole.

SCAPES radical, ascending, simple, terete, hollow, pubescent, naked, monocephalous, (*i.e.* each bearing a solitary flowerhead or *capitulum*).

INVOLUCRE deep green, hemispherical, hairy, of about 12, linear, obtuse bracts in two rows.

FLORETS; OF THE RAY white, ligulate, blunt, in about 3 rows, neuter; OF THE DISK, yellow, tubular, hermaphrodite; *ovary* oval, compressed, without pappus; *corolla* funnel-shaped, 5-lobed, slightly hairy at the base; *anthers* syngenesious, yellow, simple at base; *style* filiform; *stigma* 2-fid, with short acute plano-convex lobes.

RECEPTACLE conical, hollow, naked.

SENECIO VULGARIS: Common Groundsel.

COROLLIFLORAL EXOGENS.

Nat. Order, ASTERACEÆ, or COMPOSITES.

ROOT annual, simple, with many long slender fibres.

STEM erect, more or less branched, terete, slightly striated, pale green.

LEAVES succulent, with a few weak scattered hairs, which also occur on the stem; RADICAL obovate or spatulate, obtusely lobed, and slightly toothed; CAULINE sessile, bluntly pinnatifid, unequally toothed, at the base broader and amplexicaul.

FLOWER-HEADS solitary, in the axils of the uppermost leaves, clustered, with short arachnoid peduncles; *involucrum* somewhat cylindrical, eventually turned back upon the peduncles; *bracts* at the base triangular and sphaelated, the rest linear, acute, erect, sphaelated at the point; *florets* all tubular and hermaphrodite.

COROLLA slender, funnel-shaped, yellow.

STAMENS with yellow syngenesious anthers.

OVARY inferior minute, oblong, smooth; *style* filiform; *stigmas* 2, linear, truncated. *Pappus* soft, pilose.

RECEPTACLE flat, hollow, naked, eventually convex.

ACHÆNES fusiform, striated, minutely pubescent, with weak, spreading, silky pappus.

TARAXACUM DENS LEONIS: The Dandelion.

COROLLIFLORAL EXOGENS.

Nat. Order, ASTERACEÆ, or COMPOSITES.

ROOT tap-shaped, milky, externally black when old.

LEAVES all radical, numerous, spreading, bright shining green, quite smooth, thin, milky, narrowing downwards, pinnatifid, with unequally toothed runcinate lobes.

SCAPES usually longer than the leaves, erect, smooth, brittle, leafless.

FLOWER-HEADS solitary, calyculate; the outer scales of the *involucere* several, linear, acute, loosely recurved and wavy; inner erect, in one row, deep green, somewhat coloured and jagged at the point; finally, bent down upon the scape.

FLORETS all ligulate and hermaphrodite.

COROLLA 5-toothed, bright yellow, in the ray olive green at the back; in the disk shorter and whole coloured.

STAMENS 5, with yellow syngenesious sagittate anthers.

OVARY inferior, compressed, smooth, white, a little scabrous at the top; with a very short terete rostrum, one-celled, with a single ascending ovule; *style* filiform, pubescent on the upper half; *stigmas* 2, projecting beyond the anthers, linear, recurved. *Pappus* hair-like (pilose), in several rows, scabrous.

RECEPTACLE flat, naked.

ACHÆNES linear-obovate, slightly compressed, toothed near the apex, extended into a slender terete beak twice their own length. *Pappus* spreading horizontally, pilose.

[OBS. This plant varies greatly in its foliage.]

POLYGONUM HYDROPIPER : Biting Persicaria.

MONOCHLAMYDEOUS EXOGENS.

Nat. Order, POLYGONACEÆ, or BUCKWHEATS.

ROOTS fibrous, annual.

STEMS erect, about 2 feet high, branched, smooth, terete, reddish, rather tumid at the nodes.

LEAVES ovate-lanceolate, wavy, nearly sessile, pale green, whole-coloured, smooth; *ochrea* brown, truncate, with a few marginal bristles.RACEMES numerous, slender, spicate, drooping from the axils of all the upper leaves, leafy and interrupted at the lower part. *Bracts* stipulary, truncate, membranous, cucullate, coloured, about as long as the pedicels.

CALYX monosepalous, 4-5-lobed, imbricated, coloured at the edge, glandular on the sides.

COROLLA 0.

STAMENS usually 6, nearly hypogynous, shorter than the calyx.

OVARY superior, oval, 1-celled; *ovule* solitary, erect, orthotropal; *styles* 2 or 3; *stigmas* capitate, coloured.ACHENE monospermous, compressed, oval, acute, purplish, crustaceous. *Seed* erect; *embryo* lateral, terete, curved, on the outside of mealy albumen, with a superior *radicle*.

JUGLANS REGIA : The Walnut Tree.

MONOCHLAMYDEOUS EXOGENS.

Nat. Order, JUGLANDACEÆ, or JUGLANDS.

A large TREE.

BRANCHES, when young, terete, bright olive green, smooth and shining; after the first year grey, with globular black somewhat downy buds, large transverse scars and a chambered pith.

LEAVES close together, alternate, aromatic, unequally pinnate, with about 4 pairs of nearly opposite oblong sessile entire deep green shining *leaflets*, oblique at the base; the terminal one petiolate.

FLOWERS monœcious.

MALES in dense cylindrical pendulous solitary sessile catkins. *Calyx* unequal, herbaceous, about 5-parted, having a small bract adnate to its back.STAMENS about 15; *anthers* sessile, herbaceous, becoming black, extrorse, 2-celled, opening longitudinally.

FEMALES terminal, solitary, in pairs or clusters, sessile.

OVARY oblong, tomentose, with a superior *calyx* consisting of about 8 small unequal herbaceous scales; 1-celled, with a solitary erect orthotropal ovule; *stigmas* 2, broad, revolute, broken up into numerous irregular crests.

DRUPES oblong, with a fleshy, leathery sarcoarp, separating freely from the putamen. The latter bony, wrinkled, composed of two equal separable half-oblong convex valves.

SEED erect, on the apex of a woody intruded axis; *Cotyledons* 2, large, 2-lobed, wrinkled; *radicle* superior, conical.

CONVALLARIA MAJALIS : The Lily of the Valley.

PETALOID ENDOGENS.

Nat. Order, LILIACEÆ, or LILYWORTS.

RHIZOME slender, creeping, entangled, producing coarse fibres from its nodes.

STEM ascending, 2-leaved, clothed with 2 or 3 long membranous sheaths.

LEAVES opposite, bright green, thin, elliptical, with long slender petioles, of which one fits into the groove of the other.

SCAPE lateral, erect, not so long as the leaves, semiterete, rather angular, terminating in a many-flowered, drooping, secund, lax raceme, with a triangular axis. BRACTS membranous, acuminate, much shorter than the pedicels.

CALYX and COROLLA united into an urceolate, snow white, fragrant PERIANTH with 6 equal spreading teeth.

STAMENS 6, much shorter than the perianth, and inserted into its base; *filaments* subulate; *anthers* ovate, introrse, dehiscing longitudinally.OVARY superior, ovate, 3-celled; *ovules* several, attached to an axile placenta; *style* cylindrical, thick, twice as long as the ovary; *stigmas* 3 hairy recurved lines.

IRIS GERMANICA : German Iris.

PETALOID ENDOGENS.

Nat. Order, IRIDACEÆ, or IRIDS.

RHIZOME thick, very irregular, frequently contracted into unequal joints.

LEAVES equitant, broadly sword-shaped, acute, slightly curved, glaucous, shorter than the *scape*, which is terete, slightly flexuose, 2 feet high, or more with two or three distant erect branches.BRACTS: GENERAL (*i.e.* at the base of the branches) membranous, herbaceous, conduplicate, carinate, incurved, slightly coloured at the edge; PARTIAL (*i.e.* next the flowers) large, membranous, cucullate, obtuse, overlying each other, somewhat herbaceous and purplish, dead at the edge towards the point.

FLOWERS solitary, very large, deep purple.

PERIANTH with a large broadly expanded limb and a short bluntly triangular tube.

SEPALS 3, obovate, narrowed towards the base, where they are richly veined with deep purple on a white ground, bearded in the middle, the upper half reflexed.

PETALS 3, roundish oblong, unguiculate, erect, arching over the centre of the flower; each with a pair of fleshy auricles.

STAMENS 3, opposite the sepals, inserted into the tube, and concealed beneath the arched arms of the style; *filaments* subulate; *anthers* linear, sagittate, extrorse, bursting longitudinally.OVARY inferior, oblong, bluntly triangular, 3-celled, many seeded; *ovules* indefinite, anatropal, in two rows, on an axile placenta; *style* partly confluent with the tube of the perianth, 3 winged, separating into 3 petaloid bifid arms arching backwards over the stamens; *stigma* a long transverse cleft below the lobes of the style.

LUZULA CAMPESTRIS : Field Wood-rush.

PETALOID ENDOGENS.

Nat. Order, JUNCACEÆ, or RUSHES.

RHIZOME tough, scaly, creeping and throwing up tufts here and there.

STEMS solitary, from 3 or 4 to 10 inches high, simple, straight, terete, bearing about 2 leaves, which, like the more numerous radical ones, are flat, many-ribbed, dark green, extremely hairy at the margin, and especially at the top of the sheath.

SPIKES capitate, few-flowered, 3 or 4, one of them nearly sessile, the rest on spreading, lax, simple stalks, composing a small umbel; each ovate, or roundish, of from 4 to 6 or 8 crowded, nearly sessile flowers, enveloped by membranous, partly brown, sheathing, wrinkled bracts.

SEPALS and PETALS 3 each, lanceolate, pointed, dark brown, with a stout ribbed keel, and pale membranous margin. (*Smith, with some alteration.*)STAMENS 6, nearly hypogynous, shorter than the sepals and petals; *anthers* introrse.OVARY superior, triangular, roundish-obovate, bluntly one-celled; *ovules* 3, erect; *style* subulate, deciduous; *stigmas* 3, linear, spreading.

CAPSULE dark brown, shining, bluntly triangular, 3-valved, 3-seeded.

SEEDS erect, oval, compressed, shining, strophiolate (*i.e.* with a fungous hilum).

ORCHIS MASCULA: Male Orchis.

PETALOID ENDOGENS.

Nat. Order, ORCHIDACEÆ, or ORCHIDS.

ROOTS fleshy, simple, partly fibrous, partly testiculate, undivided.

LEAVES radical, deep green, shining, oblong-lanceolate, usually blotched with dark purple, paler on the underside.

SCAPE longer than the radical leaves, spotted with purple, with two or three sheathing leaves.

FLOWERS purple, with a few crimson spots, in a long cylindrical spike. *Bracts* lanceolate, acuminate, shorter than the ovary.

SEPALS 3, oblong; the lateral reflexed, the dorsal erect.

PETALS smaller than the sepals, but of nearly the same form, erect, arching over the column. *Lip* 3-lobed, crenulate or serrate, the lateral lobes rounded, the central retuse; *spur* cylindrical, obtuse, nearly horizontal, as long as the ovary.

COLUMN very short, with a tubercle on each side. *Anther* erect, apiculate, dehiscing in front; *pollen masses* 2, sectile, each with a long caudicle attached to a gland concealed within a common stigmatic pouch.

OVARY inferior, twisted, 1-celled, with 3 parietal polyspermous placentæ. *Stigma* concave, transverse, immediately beneath the pouch.

BROMUS MOLLIS: Soft Brome Grass.

GLUMACEOUS ENDOGENS.

Nat. Order, GRAMINACEÆ, or GRASSES.

ROOTS fibrous, few and weak.

STEMS erect, ascending, from 1 to 2 feet high.

LEAVES narrow, clothed with long soft hairs, especially on the *sheaths*, which are shaggy; *ligula* very short.

SPIKELETS in an erect downy raceme, on erect elastic pedicels usually placed in pairs, long, narrow, slightly compressed, many-flowered.

GLUMES 2, thin, acute, the *lower* with 3, the *upper* larger with 5 obscure ribs.

PALES 2; the *lower* oblong, bidentate, about 7-ribbed, with a setaceous awn from below the point externally; the *upper* linear, membranous, obtuse, with green fringed edges.

STAMENS 3; *stigmas* 2, plumose.

POA ANNUA: Annual Meadow Grass.

GLUMACEOUS ENDOGENS.

Nat. Order, GRAMINACEÆ, or GRASSES.

Root fibrous.

STEMS several, pale, very smooth, somewhat compressed, leafy, jointed, branched at the base, spreading in every direction, and taking root at many of their lower joints; their length from 3 to 12 inches.

LEAVES of a fine light green, spreading, linear, bluntish, flaccid, flat, except a crumpled portion here and there; *sheath* long, compressed, smooth; *ligula* oblong, acute or obtuse, and jagged.

PANICLE loose, rather longer than the leaves when full grown, with a somewhat secund and rather triangular outline.

SPIKELETS narrow, compressed, ovate, externally smooth, 5-6-flowered. GLUMES ovate, acute, the upper rather larger than the lower.

PALES 2; the lower deep green tinged with purple, ovate, obtuse, membranous at the margin; the upper narrower, bidentate, with the edges turned inwards.

STAMENS 3, hypogynous, with weak filiform filaments and versatilo linear anthers 2-lobed at each end.

OVARY oblong, with 2 feathery stigmas.

[N.B. This is an example of the simplest mode of describing a Grass; the fruit (corn) being omitted.]



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